PROGRAM facts

U.S. DEPARTMENT OF ENERGY
OFFICE OF FOSSIL ENERGY
NATIONAL ENERGY TECHNOLOGY LABORATORY

Strategic Center for Natural Gas and Oil

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OIL & NATURAL GAS ENVIRONMENTAL PROGRAM
PRODUCED WATER MANAGEMENT

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Background

U.S. oil production includes an average 10 barrels of water for each barrel of oil produced. Handling and disposal of this water is the single greatest environmental impediment to domestic oil production.

Especially large volumes of produced water are generated in the Western states in association with oil and gas activities. High levels of total dissolved solids (TDS) make much of this water unsuitable for use and infeasible to treat. However, a significant portion of the produced water, particularly water from coalbed natural gas (CBNG) development, has sufficiently low TDS levels to be used "as is" or to make treatment a feasible option.

There is tremendous appeal in turning wastewater from oil and gas operations into a useful product. Developing beneficial uses for produced water could reduce the costs of hydrocarbon development in the Western U.S., thus increasing the Nation's economically recoverable resources. In addition, the produced water can be used to offset problems created by near-record drought conditions, develop wildlife habitat, and provide water for agriculture, industry, and other uses.

Challenges

In the past decade the increased output of wastewater from oil and gas activities has aroused public concern. Produced water comprises 98% of all waste generated by petroleum exploration and production activities.

In the Western states, surface discharge of produced water is allowed if water meets applicable standards. This means that produced water could be a valuable resource in this arid to semi-arid region. However, a number of issues have limited the beneficial uses of produced water.

The sheer volume of water produced in the early phases of CBNG development presents significant management challenges. Media attention in the Powder River Basin and the San Juan Basin underscores the public concern on this issue. There are fears over the potential harm to aquatic life if wastewater is discharged directly into streams. Other fears are for potential harm to crops, grasslands, and soil through irrigation with produced water. Surface damage is of concern in cases where the landowner does not own the mineral rights and does not profit by development.

In many Western states water rights law can be extremely complicated and contentious. Operators may be reluctant to pursue beneficial uses because once they have made the investment to clean and use the water, their rights may be challenged. Even if the challenge is unsuccessful, the cost and uncertainty associated with litigation may make the pursuit of beneficial produced-water use unattractive.

PARTNERS

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Another legal concern is the potential for unknown future liability. While there are no known problems with using treated produced water, the specter of liability issues arising in the future still looms. Other industries have faced huge liabilities from products once thought to be benign. In addition, the possibility exists for lawsuits to be filed alleging problems where none exist. Whether these fears are founded or not, these are very real concerns that limit the beneficial uses of produced water.

Description

NETL places a major emphasis on produced-water treatment and management options as a way to reduce costs and improve environmental protection. The Produced Water Management Program focuses on finding new management techniques, assessing new water treatment technologies, and developing beneficial uses for produced water.

NETL partners with other Federal and state agencies to perform scientific assessments of produced-water resources and demonstrates how to beneficially manage them. Joint partnerships with Federal agencies include the Bureau of Land Management, Forest Service, Fish and Wildlife Service, and Minerals Management Service.

A concentrated effort will be pursued to limit the production of water where possible and to effectively treat or upgrade those produced waters that have the potential for use as potable water, in livestock watering, or in irrigation.

Another aspect of the program focuses on demonstrating CBNG produced-water best management practices. Production of CBNG generates significant volumes of water that may degrade sensitive environments or streams and may require expensive disposal procedures. During 2002-03, CBNG operations in the U.S. produced 825 million barrels per year of water. With advanced technology and improved water management practices, this water can become a valuable resource for the arid West.

Focus Areas

As of 2005, NETL has 26 recently completed or active water management projects. The major focus areas are streamlining regulatory processes; water treatment technologies using reverse osmosis; innovative filtration methods, including biologic processes; best practices management of CBNG; analysis of water toxicity; long-term monitoring of surface and ground water as it relates to wetlands; and beneficial uses for produced water.

Benefits

Beneficial use of produced water in the U.S. offers exciting opportunities for protecting the environment, lowering the cost of oil and gas production, and providing a much-needed water resource in drought-stricken areas. While there are issues that must be addressed, the potential benefits are so great that it makes sense to pursue every option to make this a widespread reality. Working with other Federal and state agencies to streamline the oil and gas permitting process will enhance efficiency and save costs for both operators and taxpayers.

Working with industry and regulators, NETL is developing new water treatment technologies, answering environmental questions, and addressing public concerns. Much remains to be done, but the results to date are promising. By pursuing multiple paths and ensuring environmental protection, efforts to increase beneficial use of produced water will allow operators to turn a costly waste product into a valuable resource. And America will see significant gains in the availability of two of her most important resources.